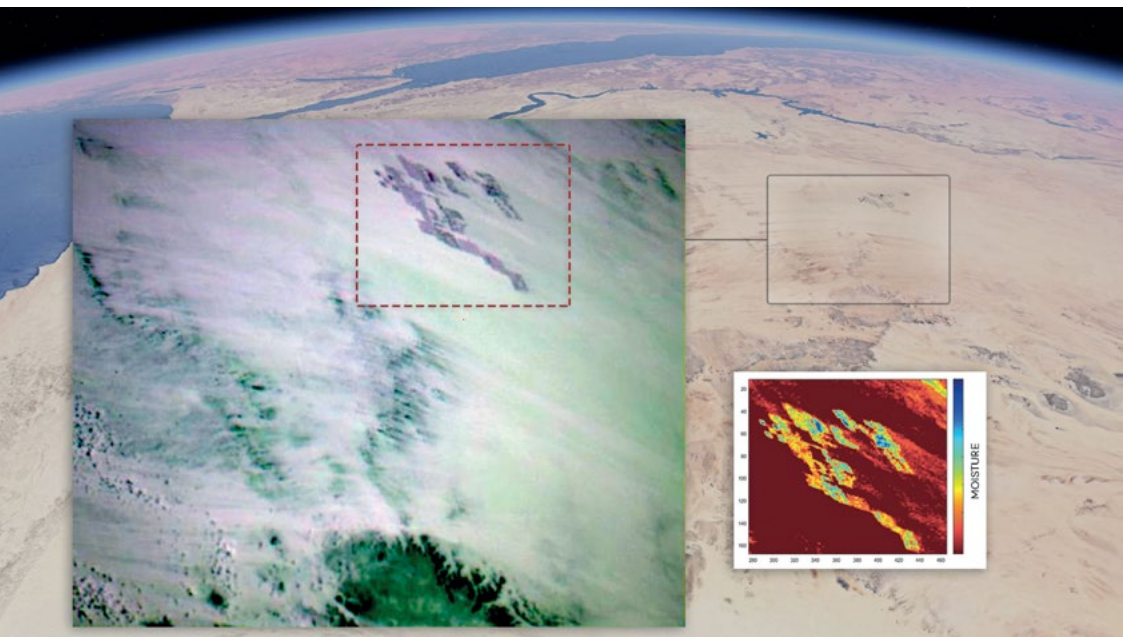


# Hyperspectral imagers for small satellites

**We offer customized miniaturized spectral imagers and sensors based on space-qualified technology**

Compact, lightweight hyperspectral camera technology enables fast high-resolution imaging with easy scalability to multiple remote sensing applications.

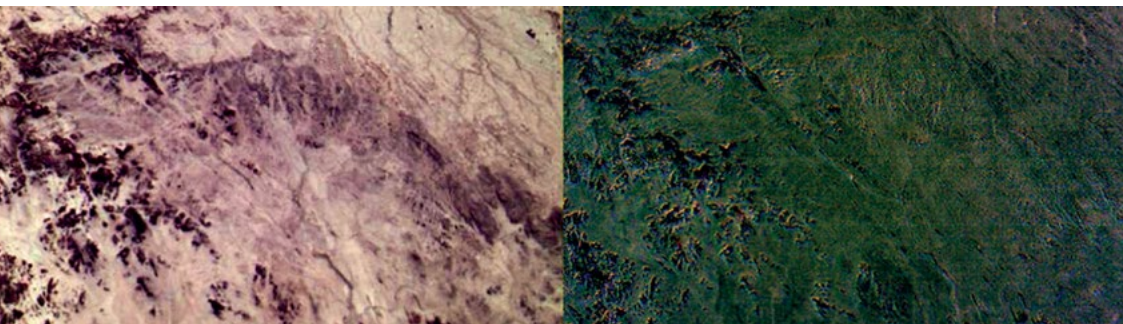


Hyperspectral images: ©VTT & Kuva Space

Background: ©Google Earth, GEBCO Landsat / Copernicus

# Benefits of our lightweight hyperspectral imagers

- Scientific-level imaging compatible with CubeSat form factor
- 2D images with freely selectable wavelengths
- Unique technology based on tunable Fabry-Perot interferometers with wavelengths from UV to thermal IR
- Robust components are tested and qualified for space instruments
- Easy application scalability - Programmable software configuration eliminates need to change hardware for new applications!
- Fast measurements with selectable wavelengths reduce the downlink data
- Superior spatial resolution and applicability in comparison to pixel-based/pushbroom imagers
- Enables various remote sensing applications: environmental measurements, forest and agriculture, monitoring of waters, atmospheric gas sensing as well as potential for generating new spectral data-based applications





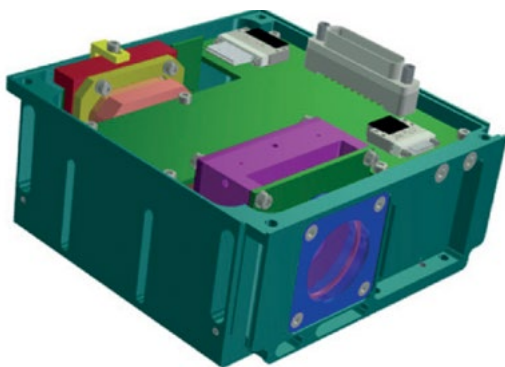
## Instruments in on-going missions

### SWIR hyperspectral camera

World's first hyperspectral imager for the short-wave infrared range up to 1600 nm.

- Launched to space in Reaktor Hello World CubeSat 12/2018
- Based on the space qualified Aalto-1 Spectral imager design

SWIR Technical specifications		Remarks
Wavelength range	925 – 1400 nm	1000 – 1600 nm
Spectral resolution	< 20 nm – 45 nm	
Spectral bands	Freely selectable	
Power consumption	< 2 W	
Size	97 x 97 x 50 mm	~0.5U
Pixel bit depth	15 bit	
Mass	< 600 g	
Field of View	10° x 10°	
Image size	640 x 512	
Input voltages	+5 V	



SWIR hyperspectral camera



VNIR hyperspectral camera

## Visible - VNIR hyperspectral camera

Light-weight instrument for hyperspectral imaging in 500 - 900 nm range.

- Launched to space in Aalto 16/2017
- Two cameras: regular and hyperspectral module
- 3 operational modes: 6, 25 and 75 wavelengths
- Built-in temperature compensation, on-board calibration possibility

VNIR Technical specifications		Remarks
Wavelength range	500 – 900 nm* <sup>1</sup> (430 – 800)* <sup>2</sup>	* <sup>1</sup> Aalto-1 spec * <sup>2</sup> Picasso spec
Spectral resolution	5 – 15 nm	
Spectral bands	6 - 80	Freely selectable
Power consumption	2.5 W	Peak
Size	97 x 97 x 48 mm	~0.5U, CubeSat compatible

VINR Technical specifications		Remarks
Mass	< 600 g	
Field of View	10° x 10° (SPE)* <sup>1</sup> 16° x 10° (VIS) 2.5° x 2.5° (SPE)* <sup>2</sup>	Aalto-1 spec Aalto-1 spec Picasso spec
Image size	512 x 512 (SPE) 2048 x 1280 (VIS)	1024 x 1024 also possible for SPE
Data interfaces	I2C for command, SPI/LVDS for data	Other interfaces available
Input voltages	+5 V and +12V	



**VTT**

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**beyond the obvious**